

*with
The Author's kind regards*

ON THE

NATURE AND PRIMARY CHANGES

OF

CANCEROUS EXUDATIONS,

AND ON THE

DEVELOPMENT OF FIBROUS STRUCTURE IN
CANCEROUS FORMATIONS;

WITH

REMARKS ON THE DIAGNOSIS OF TUMOURS OF THE NECK.

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CANCEROUS AND OTHER TUMOURS.

NOTWITHSTANDING the great advances which have been made in the study of the nature and development of cancerous growths by the labours of Bennett, Walshe, Müller, Lebert, Sédillot, Bruch, and others, there yet remain several considerations of great importance in pathology, for the complete elucidation of which other observations are necessary. Certain parts of the processes alluded to admit of a rational exposition, though we may not yet have been able to confirm our conclusions from analogy by actual demonstration. Amongst these may be ranked the formation of cancerous structure from a fluid blastema exuded from the blood-vessels, but not hitherto examined until after coagulation had reduced it to a finely molecular and granular mass, as figured and described by Professor Bennett.¹ Such exudations appear to occur in the same general manner as inflammatory ones; and yet, whilst every stage of effusion and growth of inflammatory products may be almost daily examined on the free surface of serous membranes, a cancerous exudation certainly occurs with extreme rarity in such a position, if, indeed, it is ever noticed as a primary affection. Further, inflammatory exudations possessing the characters of those effused under ordinary circumstances in healthy individuals, are frequently seen passing through their customary stages of growth in persons who are the subjects of the most extensive cancerous infiltrations, deposited from the same blood—an argument possessing great weight when urged against the doctrine of the occurrence of such morbid depositions, as the simple consequence of the circulation of diseased blood. In ordinary nutrition, development, and secretion, particular tissues exercise an undoubted power of election or appropriation of the various materials circulating through them, in some cases changing the arrangement of the elementary particles of these, if they do not actually form certain substances by their own immediate action; and so may an organ which has either become the seat of a cancerous deposition, or predisposed

¹ On Cancerous and Cancroid Growths. Ed. 1849, p. 61.

to it in some way unknown to us, exert its peculiar elective force upon the same blood as supplies other parts with materials for the formation of healthy tissue.

The following appear among the desiderata for the perfection of our knowledge of the anatomy and pathology of cancerous growths, viz., to ascertain whether fibres exist in all cancers, and are really essential for the completion of a structure, the attendant phenomena of which shall be indistinguishable from those of cancers in general. And, whether the fibrous tissue of cancerous formations bears any constant proportion in its amount to the fibrous character of the organs in which these are developed, and is regulated by the law of analogous formations. These inquiries cannot be satisfactorily answered, otherwise than by numerous and accurate microscopical examinations of the textures of organs so affected, and especially of cancers which occur in parts that contain no fibrous tissue whatever in their normal state, and in such as contain so small a proportion of it that an increase in its quantity may readily be detected. The particulars of a case in which secondary cancer of the brain occurred will be here given; and as cases of this kind are excessively rare, and no other microscopical examination of the structure of such cancers is on record, as far as I am aware, it is to be hoped that those into whose hands other cases may fall will take especial care that their characters be accurately recorded, bearing in mind that a particular density of structure is by no means a necessary attendant on a cancer possessed of a certain amount of fibrous tissue,—and that this is, consequently, a character of little service in the solution of the question proposed. In another case, it will be shown that several ounces of a fluid blastema, of the characters of liquor sanguinis, were effused into the centre of a large cancerous tumour,—that the fluid was speedily reproduced after evacuation, and that, in a few weeks, the whole was converted into a creamy cancerous liquid—having thus become completely changed in its chemical and structural characters. This case is also of importance in connection with the diagnosis of tumours of the neck and diseases of the thyroid body, which will be further illustrated by a case of cystic tumours in the position of the thyroid.

OBSERVATION I.—*Cancer of the Liver, Brain, Kidney, and of every other organ except the Heart; Cancerous deposits in the Right Psoas Muscle, on the transverse processes of the Lumbar Vertebrae, and on the Right Ilium and Femur; Tubercle and Cicatrices at the Apex of both Lungs; Granular Degeneration of both Kidneys; Anormal Nutritive Changes in the Cartilages of the Articulating Processes of the Lumbar and Dorsal Vertebrae, and in many of those of the larger Joints; Epileptic Convulsions; Partial Paralysis; Death.*

CASE.—The patient was a widow, æt. 48, who had a son when very young, and before her marriage, but no children afterwards. She gained her livelihood by carrying large baskets of fish to the country, and by selling dulse (*Rhodomenia Palmata*), which she herself pulled, standing in a considerable depth of water.

The following account of her history and symptoms was obtained from a very

intelligent neighbour, who lived on the same floor with the patient, and waited upon her when she required it. It is corroborated by several medical men, who saw her at different times during her illness.

Up to January 1849 she was stout and healthy, and regularly carried large baskets of fish into the country, remaining from home two or three days on each occasion. She lived very regularly, and was never known to have taken spirits of any kind. In January she began to complain of pains in the right hypochondriac, epigastric, and lumbar regions, and of swelling of the lower extremities; her appetite was variable; bowels constipated; the complexion became sallow, and emaciation came on. After this time she could not carry such heavy baskets as before. She applied for relief at the Dispensary, but it was occasionally thought that she complained unnecessarily, and no particular notice was taken of her for some time. She applied mustard poultices to her side on several occasions without relief, took castor oil regularly, and at last was in the habit of taking laudanum for the pains. Her sufferings were of variable intensity at different times, and she continued to go out into the country with fish until little more than a month previous to her death. Before the last occasion on which she went out, she was confined to the house for a week; she then went from home for several days, and after her return was very ill until the time of her death. She never complained of pain or difficulty in micturition. The œdema of the lower extremities increased, and she went to the hospital on April 5th, where a blister was applied to her side, and powders of chalk and opium were given for diarrhœa. She was dismissed on April 10th at her own request, and returned home. Between 8 and 9 o'clock on the evening of the same day, the neighbours heard her fall in her own house, and struggle. When they went in she was in a state of perfect insensibility on the floor, tearing her hair, struggling, and frothing at the mouth; she had a wild expression of countenance, and the corneæ were rolled under cover of the upper eyelids. The struggles continued for more than ten minutes. She was lifted into bed, and remained in a state of partial insensibility until the day following; indeed she never became as sensible as before. Her speech was indistinct; she had no recollection of having had a fit,—and though she fancied that she could hold things in her right hand, whatever food she attempted to take with it was spilled on the bed. She never walked afterwards, but stood up on the 21st, when she was removed to the Poor's-house. At this time her legs were much more swollen; she was in a state of partial insensibility; spoke incoherently, and not more than two or three words at a time. She appeared to be sinking, and wine was ordered and continued up to the time of her death. She could lift nothing, and required to be fed the whole time. On the 26th she was believed to be in a fit; froth appeared at the mouth, and there were slight movements of the limbs. This state continued an hour and a-half, and terminated in death. The body was removed to the anatomical rooms, when the following appearances were observed:—

Post-mortem Appearances.—The body is well developed; the mammæ and abdomen present numerous lines in the substance of the skin, indicative of former distension; the abdomen and lower extremities are œdematous, and fluctuation is perceived in the former. The sharp margin of the liver can be distinctly felt, an inch and a-half below the costal cartilages, in the right hypochondrium, and the epigastric and a considerable part of the left hypochondriac regions are occupied by a large, dense, nodulated tumour, having a sharp edge. A distinct, rounded, and moveable tumour, unconnected with the other, exists in the epigastric region. The os uteri admits the point of the finger, and has distinctly thickened lips; by its side, a nodulated tumour, attached to the posterior part of the cervix, can be felt. The body was injected from the femoral artery, which readily admitted the largest injecting pipe that can be used for an adult male. Twice the usual quantity of injection was thrown in without any extravasation, or escape of the injection, into the veins or right side of the heart.

Head.—The brain and its membranes are perfectly healthy in every part, except on the upper and lateral region of the posterior lobe of the left hemisphere, where there is a rounded tumour two-thirds of an inch in diameter, projecting one-eighth of an inch beyond the surface, covered by arachnoid and pia mater, which are very vascular at one spot, but appear otherwise healthy. The tumour appears to lie in a sort of cyst, owing to the cerebral matter surrounding it being very soft and friable, though of the usual colour. The white substance is diffuent as far as to the middle of the lobe.

Microscopical Examination.—The softened white substance of the brain contains its varicose tubes as perfect as in healthy brain, and, except that it is very much softened, no structural change would be observed. The gray matter around the tumour is very soft, reddish, and vascular. Its ganglion corpuscles are perfect, but it presents an occasional compound granular cell, half filled with granules; also, numerous shreds of cell-membranes, like very fine epithelial scales broken up.

On making a thin section of the tumour with Valentin's knife, a copious milky juice exudes from the cut surfaces, and shows all the structures which are found in the mass. The external parts of the tumour are resistant, and cut somewhat like cheese; the central part is granular, soft, and yellowish. The section is composed of the following structures:—Numerous mother cells, reaching $\frac{1}{340}$ th by $\frac{1}{700}$ th of an inch in size, containing one or two other cells with large nuclei, or a number of smaller cells with two or more nuclei in each; large, round, or oval cells with single large nuclei, both the cells and nuclei being finely granular; similar large cells with small and highly refractive nuclei; large cells containing two or three fat globules of large size; large flat cells, irregularly rounded, stellate or bifurcated, containing one or more large nuclei, with one or two bright nucleoli or oil globules; compound granular cells, usually $\frac{1}{1400}$ th of an inch in diameter; small, irregular, and finely granular cells; free nuclei, molecules, and granules. There are also a few fusiform cells, with elongated granular nuclei, in some places; and in others, patches of granules, which appear to have been set free from cells.—(Fig. I.)

Fig. I.

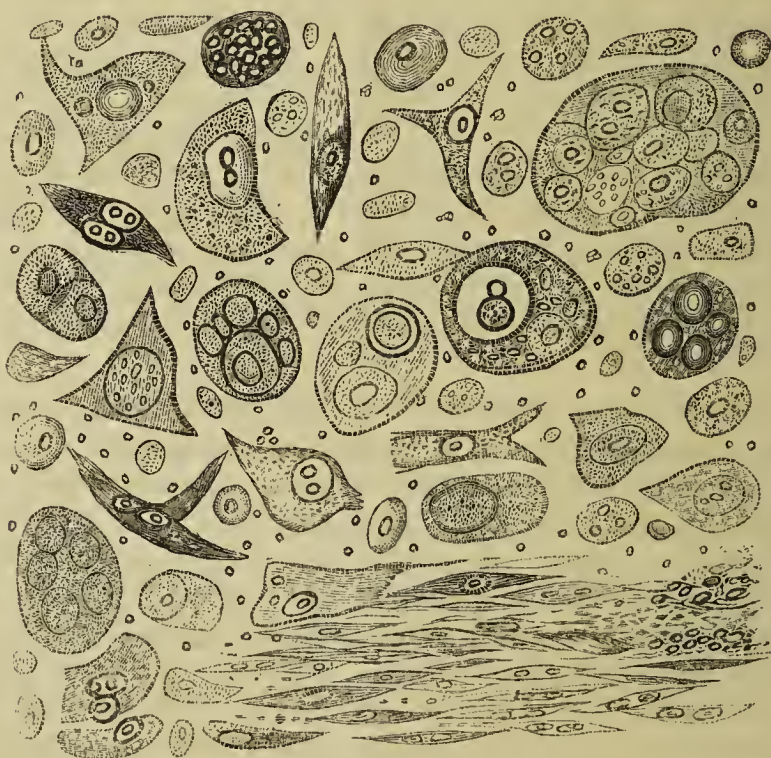


Fig. I.—Substance of cancerous tumour of the brain, showing its variously formed cells, free nuclei, and granules.

On acting upon these structures by acetic acid, the walls of the cells become very transparent; but they still remain finely granular, and the nuclei are

better seen than before ; the compound granular cells are slightly more transparent, but their granules are unchanged. Bright and loose granules still remain in the field.

After washing away the cells from a portion of the mass, and dissecting it, nothing is seen but shreds of membrane, and an indistinct granular mass.—(Fig. II.) When acetic acid is added, the mass becomes very transparent, and traces of the walls of cells become visible, with a few nuclei, and a number of granules in different parts.—(Fig. III.)

Fig. II.

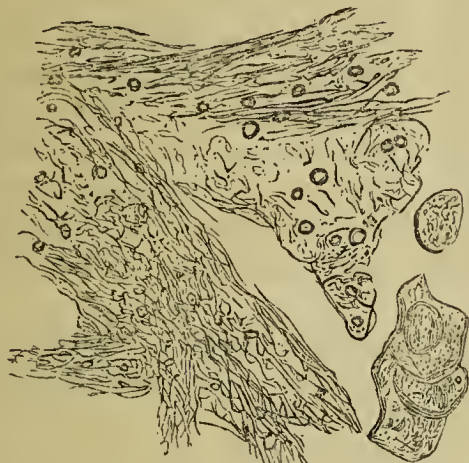


Fig. III.



Fig. II.—Remains of the substance of the tumour after dissection and washing ; it consists almost wholly of shreds of cell-membranes and of granules.

Fig. III.—A patch similar to the last after the action of acetic acid.

Chest.—The lungs have not collapsed. The right pleura, covering the lower lobe of the lung, is adherent to the diaphragm, and to the 5th, 6th, and 7th ribs, by a dense fibrous mass, one-half to three-fourths of an inch thick. At the apex of the right lung there is an extensive puckering on the surface. The pleura is thickened, but there is neither tubercle nor calcareous matter under it. In the substance of the lung, at different parts, there are yellowish-white friable deposits, which are about a line in diameter, and possess a structure precisely similar to the cancerous masses in other parts. The left lung is slightly adherent in several places for a limited extent, by thin and long bands, which break up easily. Under the pleura there are three or four small cancerous nodules, precisely like those in the opposite lung. At the apex there is a distinct puckering on the surface, under which is a yellowish-white friable mass, of the size of a pea. On dissecting a part of this in water on a slip of glass, it is at once seen to present an appearance very different from the cancerous masses ; and the microscope shows it to consist of a multitude of extremely irregular, rounded, oblong, or triangular corpuscles, varying in size from $\frac{1}{7000}$ th to $\frac{1}{2500}$ th of an inch, the greater number being $\frac{1}{3500}$ th of an inch in diameter. They contain granules, but have no nuclei in their interior. Amongst them are a number of small granules floating in a sort of blastema.—(Fig. IV.) Acetic acid renders the corpuscles transparent, but it neither changes their shape nor affects the granules.—(Fig. V.)

Fig. IV.

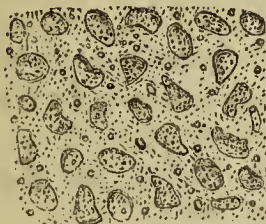


Fig. V.

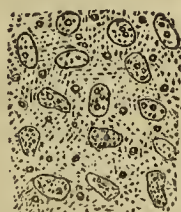


Fig. IV.—Tubercle corpuscles and granules from the small mass under the cicatrix at the apex of the lung.

Fig. V.—The same after the action of acetic acid.

The heart and pericardium are healthy, except that the parietal pericardium has four or five small, elongated, and projecting white spots upon it at the upper part. These consist of fibrous tissue.

Abdomen.—Two pints of reddish serous fluid are found in the peritoneal sac, without flakes of lymph. The peritoneum is studded, especially in the right iliac region, in the pelvis and left hypochondrium, with dense yellowish-white tumours, many of which hang by a small pedicle. The tumours vary in size, from that of a millet-seed to that of a filbert, the majority being of the former size. Some are of a crimson colour, owing to their great vascularity. The peritoneum of the liver is extensively adherent to the parietes and contiguous organs; that covering the spleen has two or three flattened masses in its substance; the peritoneal covering of the left extremity of the pancreas has some nodules in it, and that of the rectum is connected by a broad and firm band to the posterior part of the uterus. The whole omentum is contracted, and cannot be made to reach the pelvis; it is studded in every part with yellowish-white tubercles, from the size of a millet-seed to that of a large pigeon's egg. They are all of considerable consistence, and those above the size of a large pea are nodulated on the surface.

The stomach is healthy, except its peritoneal coat, which has about a dozen of the smallest sized tubercles on different parts. The small intestine is healthy, except in having a few of the small tubercles on its peritoneal coat. The appendix vermiformis has an irregular tumour, of the size of a walnut, at its extremity. On the colon, in different parts, there are many small nodules, and one or two of these are precisely of the colour and appearance of a small and ripe cherry. The colon is small throughout. The mesenteric glands appear healthy in texture, and none of them is larger than a small hazel-nut.

Liver.—The tumours felt before opening the abdomen were produced by the liver, both lobes of which are of a reddish-mottled appearance, and have large, rounded, yellowish-white masses within them and appearing on the surface, forming nodules. The right lobe measures eight inches and three-quarters from before backwards, five inches from side to side, and three inches in thickness. It presents no trace of other fissures or depressions than the transverse fissure, very ill marked; and its surface presents slightly projecting nodules, of an inch in diameter on an average. The left lobe measures eight inches from side to side, and from before backwards; and it is three inches thick. It is filled with rounded and yellowish-white cancerous masses, the largest of which is of the size of a turkey's egg. The gall-bladder lies between the right and left lobes of the liver. It is twice its usual size, and contains an irregular dark-brown calculus, of the size of a pigeon's egg; fifty-four yellow and prismatic calculi, each of the size of a large pea; and four similar ones, much smaller, and also uniform in their size.

The spleen weighs about eight ounces, but appears healthy in its interior. Substance of the pancreas healthy.

The left kidney is of the usual size and shape; the right one measures six inches long by two and a-half broad. The capsule is firmly attached to both, and their surfaces are mottled, uneven, and tuberculated, presenting almost precisely the appearance of a liver in which the tubercles of cirrosis are beginning to appear. After stripping off the capsules, small yellowish-white masses, of one-twelfth to one-eighth of an inch in diameter, are seen on the surface of both kidneys. A section shows their cortical substance to be very distinctly granular, and the yellowish-white nodules to be interspersed through their substance. The right kidney is much more tuberculated on the surface than the left; it is also more granular in its interior, and presents many more of the yellowish-white nodules. These masses are loose in texture, and are readily picked out from the surrounding parts.

Generative Organs.—At the right and posterior part of the cervix uteri there is a mass of nodules, of different sizes, joining together; and on the left side there are many similar ones, of the size of large peas. The body of the

organ is healthy. The left ovary is small, yellowish-white, hard, and granular; the Fallopian tube of this side is thickened and dark in colour, and its peritoneum is studded with nodules. The right ovary and Fallopian tube adhere together. On the former there are two small cysts, filled with fluid, and two or three nodules of the same size.

The peritoneum of the posterior part of the bladder presents several patches of beautiful, crimson nodules, of all sizes up to that of a large pea.

Cancerous deposits are also found on the ventral and dorsal surfaces of the right ilium, over a space of the size of a half-crown piece,—behind the trochanter major of the right femur,—and in the substance of the right psoas muscle, resting on the transverse processes and sides of the bodies of the second and third lumbar vertebræ. All these deposits appear to have taken place in the substance of the periosteum, or under it, so as to destroy its texture. Small ossific nodules exist on the ilium and femur at the edges of the masses of cancer, but no evident infiltration of the osseous structure has taken place, except in the case of the upper articulating and the transverse process on the right side of the second lumbar vertebra. The right articulating processes of the third and fourth lumbar vertebræ are enlarged, but dense in structure.

On examining the joints, considerable changes were found to have taken place in the cartilages of the articulating processes of the lumbar and several of the dorsal vertebræ,—in the fibro-cartilage of the right sacro-iliac synchondrosis,—in the cartilages of the right hip and knee-joints,—and in both elbow and carpal articulations. This affection of the cartilages will be found described and figured in a former paper ("Monthly Journal," vol. ix. p. 1071), showing that it is the result of anormal nutrition. It must be noted here that no trace of infiltration of the texture of the cartilage with cancerous matter existed in any part.

Microscopical Examination.—A section of a tumour, of the size of a pigeon's egg, removed from the omentum, has cheesy matter outside, and a yellow, more friable substance in its centre. A copious milky juice exudes from the cut surface, and contains rounded or irregular cells, with nuclei and nucleoli, some being so densely crowded with dark granules that their nuclei cannot be seen, and varying in diameter from $\frac{1}{850}$ th to $\frac{1}{590}$ th of an inch;—rounded or irregular cells, of various sizes down to $\frac{1}{2000}$ th or $\frac{1}{3000}$ th of an inch in diameter, containing a nucleus or a number of granules; a few compound granular cells, with large and bright granules; and also free granules and shreds of cell-membranes. (Fig. VI.) After dissection and washing, a fibrous stroma

Fig. VI.



Fig. VII.



Fig. VI.—Structure of large cancerous tumour of the omentum.

Fig. VII.—Fibrous stroma and patches of large granules, left after dissecting and washing the same structure.

is brought into view, with rows and masses of dark granules amongst its fibres. (Fig. VII.) Acetic acid has no action on the granules; but it renders the fibrous tissue transparent, and brings into view a number of cells.

The yellowish-white deposits in the kidneys contain irregular and flattened cells, which vary in size from $\frac{1}{1400}$ th to $\frac{1}{700}$ th of an inch, and contain a nucleus with one, two, or three bright nucleoli,—also numerous caudate and fusiform cells, with large granular nuclei. In many of the spots no fibrous tissue can be found, though a mass, composed of shreds of cell-membranes, is left on dissection; in others, a few fibres are observed, without any regular arrangement. The tubes of the kidney are perfectly healthy in some places, quite close upon the cancerous deposits; in others, they are filled with epithelial cells, which are compressed into various shapes, and very decidedly granular. Free nuclei are also found in the tubes. The average diameter of the tubes is $\frac{1}{470}$ th of an inch, and that of the Malpighian bodies $\frac{1}{150}$ th to $\frac{1}{128}$ th of an inch.

The cancerous deposits in the other glands, in the liver, lungs, and peritoneum, present a similar structure to the tumour in the omentum, before described.

Remarks.—The most important feature in this case was the deposit, in the substance of the brain, ascertained to be cancerous by a microscopical examination. That this is *the only test* of the real nature of any tumour of the brain, every one who has endeavoured to discriminate between them, by the appearances they present to the naked eye, will be ready to admit, and consequently all the cases which have been recorded without such examination are to a great extent valueless. In this instance, the tumour was sufficiently friable to present characters rendering it impossible to say whether it was cancer or tubercle, when examined by the naked eye; but a single glance at the cells and other structures shown in Fig. I. refers the growth to cancer, as in no other known structure whatever have similar elements been found associated in such a manner. Indeed, the structure of many of the individual cells renders them absolutely characteristic; and yet it must not be forgotten that cancerous growths by no means constantly contain such cells. The absence of fibrous tissue next calls for notice; and here it will not do to account for the absence of this element by supposing that the fusiform cells required more time to enable them to form fibres; for, in many instances, tumours, which have existed for years, and have acquired a weight of several pounds, contain no fibres, though made up of fusiform (fibro-plastic) cells. This tumour did not show a single fibre, though several slices were washed and dissected with the greatest care, with a view to ascertain their existence or absence; nothing but the mass shown in Figs. II. and III. could be seen, and this evidently consisted of shreds of cell-membranes, and portions of their contents. Yet such an isolated negative observation must not have too much importance attached to it, and we must anxiously await the occurrence of other instances. The cancerous deposits in the lungs, liver, and kidneys, presented nothing unusual; but I failed, as in several former instances, in endeavouring to ascertain what was the precise relation of the cancerous elements to the

normal structure of the organs,—an inquiry which I believe to be of the greatest importance, and one of considerable difficulty, especially as regards the liver. In a kidney otherwise healthy, there would be less difficulty, but the secreting structure of both kidneys was extensively diseased in this case, and presented the most formidable obstacle in the examination of the relations of the cancerous deposits. Notwithstanding the existence of such extensive cancerous disease, and the granular degeneration of the kidneys, the patient was able to follow her usual occupation until little more than a month previous to her death.¹ Though she was evidently sinking under the general cancerous affection, there seems good reason to believe that the epileptic paroxysms were the result of the development of the cancerous tumour of the brain, and that the death was directly produced by it.

The tubercular nature of the deposit in the apex of the left lung admits of no doubt, but it is impossible to say at what period this exudation occurred, though it is obvious that the cicatrices had existed for years.

As the changes in the structure of the articular cartilages were precisely such as are frequently found in the bodies of persons beyond adult age, there is no good reason for ascribing them to the development of the cancerous formations as to a direct cause.

OBSERVATION II.—*Large and rapidly-developed Encephaloid Tumour of the Neck; Cancer of Bronchial and Lumbo-Aortic Glands; Anasarca and Hydrothorax; Cirrosis of Liver; Death.*

CASE.—Martin Cuthbert, æt. 70, pensioner,—general appearance that of a strong and healthy man; complexion ruddy until lately, but now somewhat sallow,—applied to me for advice regarding a tumour of the neck on April 11th, 1850.

States that he always enjoyed good health until December last. He entered the army in 1798; was at the Cape from 1805 to 1814, when he went to New Orleans, and lost his arm on January 8th, 1815. Of late has travelled about the country as a hawker, carrying a very heavy box, suspended on his left side by a strap passed over the shoulder of the same side. He continued perfectly well until December 1849, when he noticed his general health not so good as usual. He takes spirits at times, but has not been habitually intemperate. He first noticed the tumour on the left side of the neck, at a little distance from the clavicle, in January 1849, since which time it has enlarged regularly and become painful.

April 11th, 1850.—A large rounded tumour, elongated from above downwards, extends from the clavicle up to the os hyoides on the left side of the neck. The skin over the tumour is very thin, and covers numerous veins, which are seen through it everywhere. Under the skin of the upper part of the same side of the chest, there are also large and tortuous veins. The tumour is perfectly even on the surface, very tense, painful on pressure, and presents very distinct fluctuation over a large portion of the surface. The sterno-mastoid

¹ In another instance, which occurred in the practice of my former pupil, Dr Polson of Old Aberdeen, the liver attained a weight of above twenty lbs., owing to the formation of melanotic cancer; and the patient, a female, æt. 48, mistook the disease for pregnancy, and went about until a fortnight before her death.

muscle is tightly stretched over the tumour; the trachea and larynx are displaced to the right side of the neck, and the left carotid artery cannot be felt. There is no difficulty of deglutition or respiration; no cough; no abnormal dullness on percussion of thorax, or unusual respiratory sounds or cardiac murmurs; no tumours are felt in the abdomen, and percussion elicits no increased extent of dull sound over it; appetite indifferent; pulse frequent.

April 17th.—The tumour is still excessively tense, and is now painful on pressure over a large portion of the surface. On entering a grooved exploratory needle into the anterior and lateral part of the tumour, it at first met with great resistance, as if from the wall of a dense cyst, and then passed with the greatest readiness. A glairy fluid escaped along the groove of the needle; and on slightly enlarging the opening with a narrow bistoury, three and a-half or four ounces were obtained. At last, the fluid passed with some admixture of blood, but that first obtained was of a slightly yellowish colour, and nearly transparent, containing small curdy masses here and there. After about ten minutes, the whole fluid withdrawn had coagulated into a firm fibrinous clot, which adhered to the vessel so firmly as not to allow of being poured out.¹ The clot, on microscopic examination, presents a finely molecular mass, full of primitive filaments, and it certainly could not be distinguished from a clot formed in liquor sanguinis. The coagulating fluid arrested my attention most firmly; and owing to other engagements, the curdy masses did not receive the attention they deserved, but round and caudate nucleated cells, about $\frac{1}{1000}$ th of an inch in diameter, were found, and, at the time, were believed to be similar to those found in the interior of the glandular processes in Obs. III., Fig. X., though there were certainly no such processes seen during the short examination of the curdy masses. The opening was carefully closed by dry lint and strips of adhesive plaster, slight pressure being also made.

April 18th.—Experienced great relief from the evacuation of the fluid from the tumour. The cavity again contains a considerable quantity of fluid, as evidenced by distinct fluctuation; but there is not the same amount of tension as before, and there exists much less pain on pressure; plasters not disturbed; some œdema of feet and legs; urine in large quantity, and loaded with urates.

April 20th.—Tumour more tense and painful; distinct fluctuation over a large portion of the surface; no discharge from the opening; plasters not disturbed; patient very desirous of further relief by puncture, which was refused. My colleague, Dr Kerr, then very kindly examined the case at my request; and considering the growth malignant and likely to open very shortly, confirmed the opinion, that much injury might result from further interference.

April 22d.—Tumour excessively tense and painful; health evidently giving way; œdema increased in extent.

The further progress of the case may be shortly stated. The tumour became more diffused some days after last report, and was never afterwards so tense or painful as before; the general indisposition steadily increased; occasional attacks of diarrhœa came on, and he was much troubled with cough, both of which symptoms were much relieved by small doses of squill and opium; the œdema steadily increased, and extended to the body. After about the 10th of May he was confined to bed; on the 30th, drowsiness came on, the pulse was scarcely perceptible, and the patient appeared to be sinking. On the morning of the 1st of June, he was evidently more feeble; he insisted on getting out of bed, and died in the chair almost immediately. The tumour did not ulcerate, and the plasters remained on until after death.

¹ A considerable increase in the quantity of fibrin in the blood of cancerous patients was noticed by Andral, Heller, and by Drs Lenzberg and Morthier. See "Monthly Journal," vol. vii. p. 70, for a condensed account of Heller's observations, showing the constant, absolute, and relative increase in the amount of fibrin, and that this may equal 16 parts in 1000 of blood.

Post-mortem Examination, forty-six hours after death.—Body very much emaciated ; slight general cedema.

Examination of the Tumour.—The skin and superficial fascia of the left side of the neck being dissected off, the clavicular and sternal portions of the sternomastoid muscle are seen to be separated from each other, and the whole muscle is much thinned and spread over the tumour. This is now seen to extend to the middle line, displacing the trachea and larynx—downwards under cover of the clavicle, and backwards under the trapezius muscle. The deep fascia of the neck appears to have given way where it covers the upper part of the tumour, but below it gives it a very tense covering. The inner and anterior part of the tumour is covered by the sterno-hyoid and thyroid muscles, and posteriorly and internally is the carotid artery, the back of the tumour resting on the vertebræ. After dissection, the surface is very soft, and in many places, a brownish creamy juice exudes from it, the softest parts now projecting in nodulated masses. The dimensions of the tumour are six and a-half inches vertically, five inches transversely, and three inches in thickness. A section being made through the whole mass, three and a-half ounces of thick, reddish, creamy fluid escaped, leaving an irregular cavity in the centre. The whole body of the tumour consists of cerebriform matter of the same characters throughout, not even excepting the most external part, which exhibits no trace of a cyst. Several small glands at the lower part of the neck contain a creamy fluid like that from the tumour. The thyroid body is of its usual size and healthy.

Thorax.—Twenty ounces of serous fluid exist in the left, and six in the right pleural cavity. Lungs healthy ; heart small but healthy ; several bronchial glands full of creamy fluid, and one situated between the bronchi is as large as the half of a pullet's egg.

Abdomen.—Liver small, probably not weighing three lbs. ; its surface is covered with small projecting tubercles, each of the size of half a pea ; structure very firm and mottled (cirrosis.) Stomach, intestines and pancreas, spleen and kidneys, quite healthy. Two enlarged lumbo-aortic glands are full of cerebriform matter ; one measures one inch and a-half long, and the other, which is spheroidal, nearly three inches in its diameter. In the centre of the latter is a quantity of matter of a yellow colour, and very friable.

Microscopical Examination.—The fluid and solid parts of the tumour of the neck, and the cerebriform and creamy matter of the glands have a similar structure. This consists of numerous round, oval, caudate, or irregularly-shaped cells, measuring from $\frac{1}{1760}$ th to $\frac{1}{850}$ th of an inch in diameter, granular on the surface, containing nuclei and nucleoli in their interior ; also of a number of free nuclei, and of a blastema, in which these structures are lodged.—(Fig. VIII.) The yellow, friable matter found in the lumbar gland consists of smaller and more irregularly-formed cells with one or two nuclei in each, and of a number of free nuclei and granules.—(Fig. IX.)

Fig. VIII.

Fig. IX.



Fig. VIII.—Cells, nuclei, and granules from the tumour of the neck.

Fig. IX.—Cells, nuclei, and granules from the yellow friable matter in the lumbar gland.

Remarks.—The rapid development of this tumour, the numerous veins shining through the skin over it and the upper part of the same side of the chest, the existence of pain, the fixity of the swelling, and its position in the neighbourhood of lymphatic glands, indicated strongly its cancerous nature; but the distinct fluctuation, the smooth and rounded surface of the tumour, the absence of difficulty of respiration and deglutition, of distinct cancerous cachexia, and of disease elsewhere, appeared rather to refer the disease to a cystic origin in the thyroid body or its immediate neighbourhood; and when three and a-half to four ounces of serous fluid flowed from an exploratory puncture, the latter view of the case gained an amount of evidence in its favour, which it was difficult to resist, in the absence of any positive proof that the disease was cancer. But it will be asked, why the cells of the curdy masses, which escaped with the fluid, were not recognised as cancerous by the microscopical examination? To this it must be replied, that no single element in the structure of cancer is sufficient in all cases to decide its nature, as has been so fully shown by Professor Bennett and other histologists; and that, admitting that the examination was not made with the same care as would have been deemed essential had the glairy fluid not been met with, and that a drawing ought to have been made of the structure of the curdy masses, it is not improbable that nothing characteristic of cancer might have been found in the cells, and that some doubt might have remained under any circumstances, owing to the close resemblance of many of the cells to those found in Observation III., notwithstanding that the tubular processes found in the latter instance were not discovered in the former. No greater error can be committed than to argue against the systematic use of the microscope in the practice of medicine, because, though it may furnish us with the most absolute physical diagnosis in nine cases, it will not do this in the tenth; nor can any better excuse be brought forward for the neglect of such an invaluable aid, in the hands of practitioners conversant with healthy structural anatomy, than that which applies with equal force to the use of the stethoscope, speculum, and every other physical examination whatever,—namely this, that all such methods are liable to error, and therefore it is better to adhere to the more remunerative and convenient mysticisms of ancient medicine. The most important practical lesson which this case teaches us, is, that the escape of several ounces of a transparent and spontaneously coagulable fluid from a large tumour by no means indicates that it is not cancerous; whilst, when considered pathologically, it demonstrates, in the most positive manner, that the several structures found in cancer grow up in a fluid and spontaneously coagulable blastema; for there is every reason to believe that the fluid withdrawn by the puncture was replaced by a liquid of similar characters in the space of twenty-four hours; and it was shown, in six weeks afterwards, that the same position was occupied by three and a-half ounces of a creamy cancerous fluid, not capable of spontaneous coa-

gulation, and thus differing most decidedly in its chemical, its ordinary physical, and its microscopical characters, from the fluid to which it owed its origin. Here we have another instance in which chemical and structural changes go hand in hand in the formation of tissue,¹ showing how much physiology and pathology have to hope for from the united labours of the chemist and histologist,—how little from either independently of the other. There could be no mistake as to the oneness of the structure throughout its whole progress; for, on the most careful examination, no cystic structure could be detected; and the thyroid body, a very common seat of such formations in the neck, was perfectly healthy. In considering the origin and cause of this disease, it must be stated, that, after the patient's death, I ascertained that his mother was believed to have died of cancerous disease; and that, on the last occasion when he was in the country pursuing his usual avocation, he found the pressure and tension exerted upon the tumour by the strap which suspended his box so insupportable, that he was obliged to return home and leave his goods in the country. It thus appears that, besides a very strong hereditary predisposition, there existed a very important exciting cause, acting on that part alone where the tumour was developed; and, therefore, to these causes, in the absence of more probable ones, we must ascribe the disease. It is not to be overlooked that secondary deposits were found in lymphatic glands at the lower part of the neck, in several bronchial, and in two lumbar glands, while no trace of cancerous disease was detected in any organ.

OBSERVATION III.—*Large Cystic Tumour in the neighbourhood of the Thyroid Body, with Fungous Projections into the Trachea and Œsophagus; Discharge of Bloody Fluid after Tapping; Great Difficulty in Respiration and Deglutition; Death in a Paroxysm of Dyspnoea.*

CASE.²—George Sutherland, æt. 43, saddler, of tall and spare habit, complexion pale, applied as an out-patient at the Aberdeen Royal Infirmary in November 1847, for advice regarding a tumour of the anterior and left side of the neck in the position of the left lobe of the thyroid body. States that the swelling began about six years ago, as a small tumour on the fore part of the neck, and that it has gradually increased since that time, without becoming painful. He knows no cause for it; but says, that a little before it appeared he had chancres and buboes, for which he took mercury until his mouth was very sore. Secondary symptoms followed, and at present he has a node on the left shin, and some copper-coloured spots on the left arm and hip. His child, born since he had the syphilitic affection, has always been quite healthy.

The tumour is now of the size of the clenched fist, and can be handled freely without pain. It extends under the left sterno mastoid muscle, and obscures many of the parts on that side of the neck; but the os hyoides, the thyroid and cricoid cartilages, and the trachea, are still to be felt. Numerous enlarged veins are spread over the whole surface, which is irregularly nodulated, the substance

¹ See former remarks on this head in the "Monthly Journal," vol. ix., p. 1282.

² The particulars of this case, and of the post-mortem examination, have been very kindly furnished me by Dr Kilgour from his case book. The microscopical examination was made by myself, and the account here given of it, together with the woodcuts in Fig. X., have been taken from my own notes and drawings made at the time.

of the tumour being dense in some places and fluctuating indistinctly in others. Behind the sterno-mastoid there are two small tumours, each of the size of a large almond, but neither glandular enlargements nor other tumours can be detected elsewhere in the body.

December 26th.—Has been applying mercurial ointment to the tumour, and taking iodide of potassium internally for some time. Tumour somewhat softer in two places, and fluctuating. Complains of increasing difficulty in deglutition and of headache. Expectorates a quantity of blood, which communicates a sensation as if coming from the windpipe, about the lower part of the tumour. Has no cough.

January 31st, 1848.—A small opening was made yesterday into the most dependent part of the tumour, where fluctuation was most distinct ; four or five ounces of a deeply-red serous fluid escaped, and coagulated very abundantly on the addition of nitric acid ; the opening was closed with adhesive plaster.

February 1st.—Swelling very tense. A reddish discoloration exists around the puncture, from which no discharge has issued.

February 27th.—Swelling as large and tense as before ; fluctuation more distinct ; headache frequent, especially on the left side ; expectorates a small quantity of bright red blood daily, and thinks it comes from the throat ; has no cough ; general health not so good as formerly. Ordered to take a grain of quinine night and morning.

March 12th.—Ordered to take fifteen drops of liquor potassæ three times daily.

May 14th.—Fluctuation in the tumour very distinct ; patient very desirous to have another opening made. On passing an exploratory needle into the most depending part, near the former puncture, four ounces of a dark bloody fluid, without smell, escaped, and the size of the tumour is much diminished. A hard tumour, fully of the size of a pigeon's egg, can now be felt at the lower and right side of the swelling, and dense bands appear to cross from it to the sides of a thick cyst. Has had no expectoration of blood for the last fortnight ; no cough ; general health good.

May 20th.—Tumour has burst several times since last report, and discharged a quantity of bloody fluid on each occasion ; wound small, and shows no disposition to ulcerate ; swelling now much as before, and gives no pain, even on pressure ; fluctuation more distinct ; general health good ; compresses ordered to be applied.

June 11th.—Wound has been healed up for some time ; swelling exactly as before, and not painful ; directed not to allow other punctures to be made, and ordered to take iodine and iodide of potassium.

November 13th.—Admitted into St Luke's Ward on October 30th, for ulcers on the left tibia, resulting from periostitis, and the formation of two abscesses. He has been taking the decoction of sarsaparilla, and the sores have improved. Tumour of neck much the same, and not painful ; more glands behind the left sterno-mastoid, and some at the lower and outer part of the neck on the same side, are enlarged ; has slight cough ; again occasionally expectorates bright red blood. To have nourishing diet, and to continue the decoction.

December 7th.—Has remained in bed and taken the decoction, animal food daily, and wine ; improvement continues ; sores nearly healed ; expectoration of blood still going on ; tumour enlarged and very tense ; fluid in separate cysts easily detected. Dismissed.

December 26th.—Patient said to be much worse, and when visited at home found to be labouring under great dyspnœa, so much aggravated by paroxysms, which are brought on by any excitement, that suffocation appears imminent ; the tumour is larger, and now extends to the upper part of the sternum ; cough frequent and very severe ; voice much more hoarse than formerly ; has expectorated a considerable quantity of blood at different times since he left the hospital ; difficulty of deglutition very great, and has increased much since he was last seen.

January 5th, 1849.—Died to-day in a paroxysm of dyspnœa.

Post-mortem Examination, thirty hours after death.—The tumour appears somewhat less in size ; the skin, removed from the neck without exposure or incision of the substance of the tumour, separated readily from every part, except in the neighbourhood of the punctures, where firm adhesion to the deeper textures had taken place. The trachea and œsophagus were divided close to the sternum. A transverse incision was made above the os hyoides, and the parts between these sections were removed. The handle of a scalpel passes with some difficulty through the œsophagus from below upwards, and on opening the tube it is seen to be obstructed or narrowed by a serous cyst, which presses on it from without, and is of the size of a small walnut,—the remaining cervical part of the œsophagus is narrowed ; two fungous tumours, each of the size and shape of half the kernel of a hazel-nut, exist on the left side of the tube, at its point of junction with the pharynx, and are also seen from the inside.

On opening the larynx and trachea from behind, the mucous membrane presents a deep-red colour, and a covering of mucus ; much swelling and infiltration exists in the parts in the vicinity of the glottis ; a fungous tumour, of the size of a large pea, projects into the trachea near to the sternum ; the thyroid and cricoid cartilages are carious or softened, but the tumour penetrates the air-tube only in the spot above named.

The tumour itself consists chiefly of three large and prominent cysts, the largest being of the size of a hen's egg. Two of them communicate, and these were emptied by opening one. The whole three contain about seven ounces of thin bloody serum. The walls of the cyst are thick, and densely fibrous in front, the spaces between them being occupied by fibrous tissue in bands. As the hasty dissection was made by gas-light, and the thyroid body was not seen, it cannot be stated with absolute certainty whether or not the disease originated in it ; but the site of the thyroid, and the whole space extending from the upper part of the thyroid cartilage to the sternum, are entirely occupied in front by the cysts, and behind by the soft reddish mass which covers the sides of the larynx and œsophagus, extending also between the œsophagus and trachea, and protrudes into the largest cyst behind, as well as into the trachea and œsophagus. The mass exists in largest proportion on the left side of the neck, and, except in the position of the protrusions last named, is covered by a dense fascia. A small prolongation of it passes behind the sternum into the chest. Two or three enlarged cervical glands exist on the outer side of the tumour ; but these are quite free from it, and present no traces of similar disease. One of them is larger than a pigeon's egg.

Chest.—Pleuræ and right lung healthy ; upper lobe of left lung slightly hepatised. Heart healthy.

Head and abdomen not examined.

Microscopical Examination of the Tumour.—The reddish-brown soft fungous mass is of the same structure throughout, and consists of villous processes, which float from each other in water, and can easily be separated with needles. These processes are formed of a central branched duct, each of the divisions of which terminates in grape-like bunches of lobules (Fig. X., *a*), indistinguishable from portions of an ordinary compound gland. The ultimate lobules consist of single or branched cœcal tubes, or of tubes ending in flask-shaped or otherwise dilated extremities (*b*, *c*, *d*). Their basement membrane is distinct, though thin, and supports on its interior a beautiful and complete covering of spheroidal epithelium, the cells of which measure from $\frac{1}{1250}$ th to $\frac{1}{1000}$ th of an inch in diameter, are finely granular, and contain a bright nucleus. They are immediately distended on the addition of water (*e*), and become caudate (*f*) on the application of the slightest pressure. The mass contains also a few short and nucleated fusiform cells (*g*), and two small round cysts, attached to a common stalk. Each of these cysts measures $\frac{1}{15}$ th of an inch in diameter,

and consists of a thin membrane, on which is a beautiful vascular network, derived from the vessel of the common stem, the interior being occupied by a clear fluid.

Fig. X.



Fig. X. shows the structure of the reddish-brown soft substance in the tumour:—*a*, appearance of villous processes, when slightly separated and viewed by a lens; *b*, edge of one of the villous processes; *c* and *d*, tubes lined by epithelium, and terminating in bifid or dilated extremities; *e*, epithelial cells of the tubes and vesicles, somewhat distended by the action of water; *f*, the same rendered caudate by pressure; *g*, fusiform cells, found in very small number.

Remarks.—The tumour, in this instance, differed from that in the last case in commencing in the middle line of the neck,—in being painless throughout its progress,—in enlarging very slowly,—in occasioning but little inconvenience for many years, and then causing great difficulty in respiration and deglutition,—characters which, with the distinct fluctuation towards the last, and the history of the case, referred it to the class of cystic tumours of the thyroid body. Yet, it was covered by large veins,—for a while, the fluctuation was indistinct,—and glandular enlargements took place in its vicinity; whilst, after death, fungous growths proceeding from it were found to have penetrated the trachea and œsophagus,—in all which respects the growth partook of the general characters of cancerous disease. The fluid removed by tapping appears to have been albuminous, and rapidly reproduced; such tendency to hemorrhage from the walls of the cyst resulting from the evacuation, that its repetition became exceedingly dangerous, and was strictly forbidden. The patient died from asphyxia, produced by the protrusion of the fungous mass into the interior of the trachea. The post-mortem examination revealed the compound cystic character of the disease, and disclosed the soft, reddish-brown mass projecting into the posterior wall of the largest cyst—into the trachea and œsophagus. The ultimate structure of this soft mass resembled that of secreting glands; but its cells presented no characters which could lead to the belief that they

were capable of producing others like themselves, nor did they offer any explanation of the mode of extension of the growth into the trachea and œsophagus. So far as is at present known to us, the disease was irremediable; for iodine had no effect in producing absorption, the tapping was attended with serious danger from hemorrhage, and every other operative procedure was quite out of the question.¹

General Remarks on the Diagnosis of Tumours of the Neck.—This always presents great difficulties when the tumours are of large size, only slightly painful, and fluctuate indistinctly. If a complete and accurate history of the case cannot be obtained, more than a general diagnosis may be impossible; but when the precise position of the tumour at its commencement can be made out, when its relations to the larynx and trachea, and its mobility in regard to them and the surrounding parts when it was of small size, can be ascertained, together with the rapidity and manner of its growth, there will be little difficulty in arriving at a satisfactory conclusion.

A *tumour* developed in the substance of the *thyroid body* presents itself in the front of the neck, is usually larger on one side than the other, is firmly connected with the larynx and trachea, moves freely with the larynx in deglutition, and when it is displaced laterally by manipulation. The other features vary with the nature of the tumour.

In *ordinary bronchocele* (hypertrophy) the swelling is soft, projecting, elastic; without fluctuation, pain or tenderness on pressure; it occurs usually in early life, in the female sex, and in particular districts of country; it is simple in its nature throughout, and presents no tendency to degeneration or change of structure; it in no way interferes with respiration or deglutition, nor does it affect the patient's health or comfort until it becomes of very large size, when difficulty of respiration and deglutition, with frequent headaches, occasion the greatest distress, and may end in the death of the sufferer.

In *cystic disease of the thyroid* the nature of the tumour becomes manifest, sooner or later, by the presence of fluctuation in one or more cysts, by a glairy, serous, or sero-sanguinous fluid escaping readily along a grooved needle when introduced, the fluid containing no cellular formations when examined microscopically, or having

¹ A somewhat similar case will be found noticed in the catalogue of the Museum of St Bartholomew's Hospital, pp. 353 and 354. The patient, an elderly woman, had a large cyst in the right lobe of the thyroid body,—a spontaneously coagulable fluid was evacuated from it on two occasions, after which its wall inflamed, pus and lymph filled the cavity, ulceration of the posterior wall of the cyst and the adjacent part of the pharynx took place, and the patient died suffocated by the sudden discharge of the contents of the tumour, and the passage of some of them into the larynx.

such a structure as is inconsistent with the idea of the existence of cancer,—by the formation of the tumour taking place at or after the middle of life,—by its slow and painless growth, and by the slight inconvenience it occasions as long as its size is not very great.

In cancerous disease of the thyroid (usually scirrhus) the tumour appears between forty-five and sixty-five years of age, is of great and uniform density, and generally painful; it is developed rapidly, and may attain a large size in the course of a few months; it accompanies the larynx in its movements, but shortly limits their extent by attaching the organ to the surrounding parts; it occasions great difficulty of deglutition and respiration from an early period;—hoarseness, cough, and spasmodic action of the muscles of the larynx and pharynx come on and increase in their intensity,—the distress and anxiety of the patient, his sallow complexion and emaciation, marking him out as the subject of a steadily advancing and destructive malady.

In *medullary cancer of the thyroid* the surface of the tumour may be even and tense, or indistinct fluctuation may be perceived; the other characters, depending on the steady infiltration of the surrounding textures, distinguishing the disease from other tumours of the same part.

Enchondromatous tumours are to be recognised by their great density, the slowness of their growth, and the absence of any signs of the extension of the affection to the surrounding parts, and of general evidence of the existence of malignant disease.

The diagnosis of *tumours of the neck, not connected with the thyroid body*, is to be established by reference to the general characters which distinguish them in other situations, every particular of their history and mode of growth being carefully ascertained as essential points, and sufficient care being exercised lest the presence of a quantity of coagulable fluid, in the interior of a cancerous tumour, as in Obs. II., lead to the belief that it is of a cystic character.

I shall complete this paper by a short consideration of the important question,—*Whether or not fibre is an essential element in the structure of cancer?*

Much difference of opinion still exists as to what are the parts of a cancerous growth which are essential to it. Professor Bennett states that fibres, cells, and a viscous fluid, are the three essential elements of a cancerous formation. Lebert regards the cancer-cell as the only distinctive, constant, and essential element, the predominance of one or other of the accidental and secondary elements determining the varieties of form and appearance; yet he regards the fibres as next in point of importance and frequency, and speaks of them in encephaloma as pale, fine, and in small quantity. Müller says that the fibres of encephaloma are indistinct, and that the fusiform cells are arrested in their development into fibres;—whilst Vogel states, that in encephaloma fibrous structures are wholly absent. As

has been before remarked, it is excessively difficult to state whether the fibres which are found in many tumours are really cancerous, or whether they belong to the proper structure of the organ in which the tumour has been developed; and, consequently, careful examinations of cancerous formations in organs which contain no fibrous tissue in their healthy state, become of extreme importance in leading to a true determination of the mode of development and actual position of the fibrous element in cancer.

From the examination of the cancer of the brain here recorded, and of numerous cases of encephaloma, I am led to believe that fibres are by no means invariably to be found in such growths, and that their fibrous element is accessory and non-essential. If this be so, the existence of fibrous tissue in most cancerous structures remains to be accounted for in either of two ways,—viz., by hypertrophy of the normal fibrous tissue of the part, or by a new development of fibre from the recently diffused blastema,—a development commenced and completed under the influence of the determining energy exerted by the fibrous tissue of the part itself, agreeably to the law of analogous formations. Presuming that the fibrous element of cancer is developed in either of the methods just indicated, its absence in cancer of the brain is readily accounted for, as in that organ there is no fibrous tissue to acquire an unusual development, or to determine the formation of new tissue of its own kind from cells. *If proper cancer cells, of a fusiform shape, ever become transformed into fibres,* their presence in cancer of the brain, unaccompanied by the fibrous element, may be owing to a deficiency of the stimulus necessary to ensure such development, and may possibly be dependent on the absence of fibres in the original and healthy texture of the organ.

In conclusion, I would suggest that a carefully conducted statistical inquiry into the relative amounts of the various elements of which cancerous deposits are composed, viewed in connection with the normal structure of the organs in which each one is found, would be of great service in the further examination of this difficult problem, and that it might perchance lead to its satisfactory solution.

